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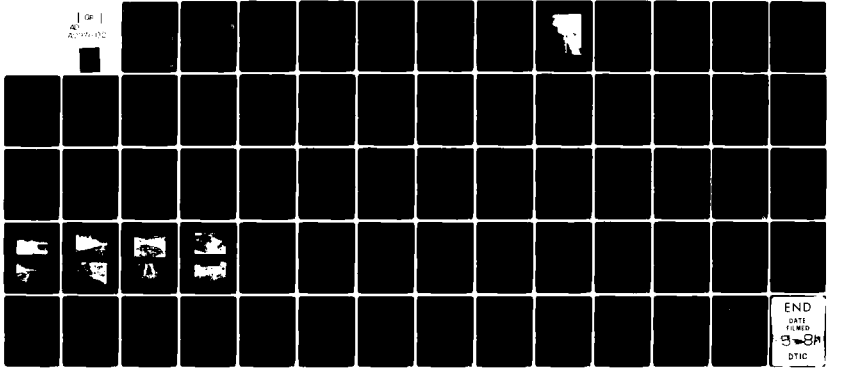

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DELAWARE RIVER BASIN

TRIBUTARY TO LAKE WALLENPAUPACK, WAYNE COUNTY

PENNSYLVANIA

DEER LAKE DAM

NDI ID NO. PA-00698
DER ID NO. 64-202

WALLENPAUPACK LAKE ESTATES

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DACW31-81-C-0018

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JANUARY 1981

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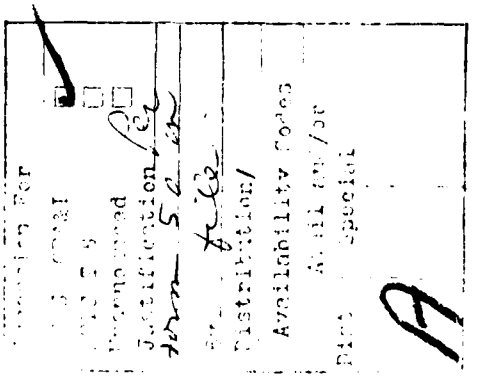
PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



DEER LAKE DAM

NDI ID No. PA-00698, DER ID No. 64-202

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

CONTENTS

APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Deer Lake Dam NDI ID No. PA-00698 DER ID No. 64-202
Size:	Small (12 feet high; 114 acre-feet)
Hazard Classification:	High
Owner:	Wallenpaupack Lake Estates Property Owners Association P.O. Box 109 Hamlin, PA 18427
State Located:	Pennsylvania
County Located:	Wayne
Stream:	Unnamed Tributary to Lake Wallenpaupack
Date of Inspection:	28 October 1980

Based on available records, visual inspection, calculations, and past operational performance, Deer Lake Dam is judged to be unsafe, nonemergency, because the spillway capacity is rated as seriously inadequate. Based on the size and hazard classification of the dam, the recommended Spillway Design Flood (SDF) varies between 1/2 the Probable Maximum Flood (PMF) and the PMF. Based on the size of the dam and reservoir, the 1/2 PMF is selected as the SDF. The existing spillway will pass only about 15 percent of the PMF before overtopping of the dam occurs. It is judged that the dam could not withstand the depth and duration of overtopping that would occur for the 1/2 PMF. Failure of the dam would cause an increased hazard for loss of life downstream. Overall, the dam is judged to be in fair condition.

No stability problems were evident for the dam or appurtenant structures.

The ability of the outlet works to function is unknown. There are no upstream closure facilities.

Maintenance of the dam needs to be improved. The right half of the dam is overgrown with trees and brush, and large trees are growing along the downstream toe.

The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Perform additional studies to more accurately ascertain the spillway capacity required for Deer Lake Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take appropriate action as required.

(2) Determine the ability of the outlet works to draw the reservoir down to an appropriate level and, if the existing outlet works cannot draw the pool down, develop suitable means of drawing down the reservoir in case of an emergency. Any pipe that is placed through the embankment should be provided with an upstream closure facility. The buried outlet should be uncovered to provide for free discharge.

(3) Remove trees and brush from the dam and along the toe.

(4) Fill in the low areas on the top of the dam and all burrowing animal holes.

All investigations, studies, designs, and inspection of contruction should be performed by a professional engineer experienced in the design and construction of dams. Tree removal should also be under the guidance of a professional engineer.

In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Deer Lake Dam. When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of the dam.

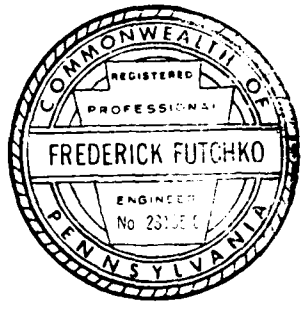
(3) Initiate an inspection program at the dam such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Expand the existing maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

DEER LAKE DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.



FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 9 February 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 4 March 81

DEER LAKE DAM

Overview

DEER LAKE DAM

NDI ID No. PA-00698, DER ID No. 64-202

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Deer Lake Dam consists of an earthfill embankment of varying cross section, a twin 27-inch diameter corrugated metal pipe spillway, and a 6-inch diameter cast iron pipe outlet conduit. The overall length of the dam is 460 feet. The dam is about 12 feet high. The top width varies from about 15 feet to 23 feet. The top of the dam is used for access to the lake by adjacent property owners, and one property owner has constructed a bulkhead near the left abutment. The upstream earth slope is approximately 1V on 2H, and the downstream slope varies from 1V on 1.8H to 1V on 4.5H.

The spillway consists of two 27-inch diameter corrugated metal pipes located near the left abutment. The pipes discharge well downstream of the embankment into an unlined channel. A trashrack of welded steel reinforcing bars covers the inlet ends of the pipes. The upstream inverts of the pipes are elevations 1335.3 and 1335.4 or about 1.4 feet below the lowest top of dam elevation.

The outlet works consists of a 6-inch diameter cast iron pipe riser, a 6-inch diameter cast iron pipe through the embankment, and a gate valve on the downstream end of the pipe. The valve has not been operated for several years.

b. Location. Deer Lake Dam is located on an unnamed tributary to Lake Wallenpaupack about 0.4 mile west of Lake

Wallenpaupack. Deer Lake Dam is shown on USGS Quadrangle, Lakeville, Pennsylvania, with coordinates latitude N 41° 23' 42" longitude, W 75° 16' 00", in Paupack Township, Wayne County. A location map is shown on Plate E-1.

c. Size Classification. Small (12 feet high, 114 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Deer Lake Dam (Paragraphs 3.1e and 5.1c(5)).

e. Ownership. Pat Cuff, Manager, Wallenpaupack Lake Estates Property Owners Association, P.O. Box 109, Hamlin, PA 18427.

f. Purpose of Dam. Recreation.

g. Design and Construction History. According to the present Owner, the dam was constructed sometime between 1968 and 1970 by a local contractor, Paul Evans, apparently for a developer who sold properties and eventually sold the dam to the Property Owners Association. The Owner has no plans, specifications, reports, or other information concerning the dam and its construction.

Reportedly, the outlet and spillway pipes were modified approximately 3 or 4 years ago. There are no plans or other information available regarding these modifications.

h. Normal Operational Procedure. The pool is maintained at the spillway crest level with excess inflow discharged through the 27-inch diameter spillway pipes. The emergency drawdown facility consists of a standpipe with an invert elevation of 1335.0, which will only draw the pool down 0.3 foot. Spillway discharge flows downstream to Lake Wallenpaupack.

1.3 Pertinent Data (existing conditions).

a. Drainage Area. (square miles) 0.28

b. Discharge at Damsite. (cfs)

Maximum known flood at damsite	Unknown
Outlet works at maximum pool elevation	Unknown
Spillway capacity at maximum pool elevation	60

c. Elevation. (feet above msl.)

Top of dam	1336.7
Maximum pool	1336.7
Normal pool (spillway invert)	1335.3

c. Elevation. (Cont'd.)

Upstream crest outlet works	1335.0
Downstream invert outlet works	1326.0±
Streambed at toe of dam	1325.0±

d. Reservoir Length. (miles)

Normal pool	0.35
Maximum pool	0.35

e. Storage. (acre-feet)

Normal pool	79
Maximum pool	114

f. Reservoir Surface. (acres)

Normal pool	24
Maximum pool	27

g. Dam.

Type	Earthfill
Length (feet)	463
Height (feet)	12
Top width (feet)	Varies, 15-23
Side Slopes	
Upstream	1V on 2H
Downstream	Varies, 1V on 1.8H to 1V on 4.5H
Zoning	Unknown
Cutoff	Unknown
Grout Curtain	Unknown

h. Diversion and Regulating

Tunnel.	None

i.	Spillway.	
	Type	2-27" C.M.P.
	Invert Elevation	1335.3
	Upstream Channel	Reservoir
	Downstream Channel	Vegetated earth channel
j.	Regulating Outlets.	
	Type	6" C.I.P. with gate valve
	Invert Elevation	Unknown

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. No design data are available for the original dam or the subsequent spillway modifications. No drawings are available.

b. Design Features. The project is described in Paragraph 1.2a. The various features of the dam are shown on the photographs in Appendix C and on Exhibit B-1 and Plate E-2.

c. Design Considerations. There is insufficient data to assess the design.

2.2 Construction.

a. Data Available. No construction data are available, except for the name of the contractor (Paul Evans) and the reported modifications to the spillway and outlet pipes, about 1977.

b. Construction Considerations. There are insufficient data to assess the construction.

2.3 Operation. There are no formal records of operation. There have been no previous inspections by the Commonwealth.

2.4 Evaluation.

a. Availability. Engineering and construction data were not available. The Owner's representative, Mr. Pat Cuff, Manager, Wallenpaupack Lake Estates Property Owners Association, made himself available for information during the visual inspection.

b. Adequacy. Since no engineering or construction data are available, the assessment must be based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. All available data is based on conversations with the Owner's Representative.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The overall apearance of the dam is fair. Some deficiencies were observed as noted below. A sketch of the dam with the locations of the deficiencies is presented on Exhibit B-1 in Appendix B. Survey information acquired for this Report is summarized in Appendices B and E. Datum for the survey was taken at the water surface, Elevation 1335.0, which is also the elevation of the 6-inch diameter cast iron pipe outlet.

b. Embankment. The embankment is in generally fair condition. The upstream slope has eroded at the waterline over the entire length of embankment. The top of dam is very irregular and varies in elevation from 1336.7 to 1338.2 The results of the survey performed for this inspection are shown on Plate E-2. Two low areas were observed on the top of dam in the vicinity of the spillway and outlet pipes. One area, about 120 feet from the left abutment is 15 feet x 3 feet x 18 inches deep (Photograph F). A second area is about 12 inches low and is located over the spillway pipes. Seepage was observed at the toe of the dam in the excavated channel for the 6-inch diameter outlet pipe (Photograph E). Trees and brush cover the upstream and downstream slopes particularly on the right half of the dam. Numerous pine trees grow along the toe and on the downstream slope (Photograph D). Animal burrows were observed on the downstream slope near the right abutment.

c. Appurtenant Structures. The spillway is in fair condition (Photographs G and H). Both the inlet and the outlet ends of the pipes have been damaged and partially crushed out of round. Minor erosion has taken place around the pipe inlets. Fill around the pipes has settled substantially along the entire length of pipe. The spillway pipes discharge through a dry masonry headwall well downstream of the dam into a heavily vegetated earth channel, which is in fair condition.

Except for the top of the riser pipe, the 6-inch diameter cast iron pipe outlet conduit was submerged and could not be inspected. The outlet end of the pipe was buried and could not be found. The gate valve on the pipe was found and appeared to be in good condition. Because the outlet end of the pipe was buried, the gate valve was not operated during the inspection.

d. Reservoir Area. The reservoir slopes are moderate and mostly wooded, as is the watershed. The watershed contains some open fields and scattered homesites. Two small ponds are located on the southwest side of the reservoir.

e. Downstream Conditions. Two recently constructed houses are located at the toe of the dam and 6 to 8 other houses are located along the stream between the dam and Lake Wallenpaupack. The two houses at the toe of the dam would sustain major damage in the case of a failure of Deer Lake Dam. The other houses would experience flooding to varying degrees.

Just downstream from the dam an unpaved road crosses the spillway discharge channel. Flow under the road is conveyed through a 48-inch diameter corrugated metal pipe. Three other unpaved roads cross the stream channel between the dam and Lake Wallenpaupack.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at the spillway crest elevation 1335.3 with excess inflow discharging through the spillway pipes. The outlet works is not used for maintaining pool elevation.

4.2 Maintenance of Dam. There are no formal regular inspections or maintenance procedures for Deer Lake Dam. The security patrol of the Property Owners Association performs informal inspections on a daily basis. Maintenance is performed when believed necessary.

4.3 Maintenance of Operating Facilities. Maintenance of the operating facilities is considered poor. The gate valve on the outlet pipe reportedly has not been operated for several years and the outlet end of the pipe is buried.

4.4 Warning System in Effect. There is no emergency operation and warning system.

4.5 Evaluation of Operational Adequacy. The maintenance of the upstream and downstream slopes, the top of the dam, the spillway pipes, and the outlet works facilities need to be improved. The daily inspection program is good. Formal inspections are necessary to detect potentially hazardous conditions at the dam. A detailed emergency operation and warning system is necessary to reduce risk of dam failure should adverse conditions develop and to prevent loss of life should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. No design data are available for the original dam construction or the subsequent spillway modifications. Calculations performed as part of this inspection indicate that the spillway capacity is approximately 60 cfs with the reservoir at elevation 1336.7, the lowest elevation of the top of dam.

b. Experience Data. No rainfall, runoff, or reservoir level data were available. Reportedly the spillway has functioned adequately in the past and the dam has not been overtopped.

c. Visual Observations.

(1) General. The visual inspection of Deer Lake Dam, which is described in Section 3, resulted in a number of observations relative to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The top of dam is very irregular and varies in elevation from 1336.7 to 1338.2. For purposes of this report, elevation 1336.7 is judged to be the top of dam elevation. This elevation is 1.4 above the invert of the spillway pipes. Other observations at the embankment are evaluated in Section 6.

(3) Appurtenant Structures. Both the inlet and outlet ends of both spillway pipes have been damaged and partially crushed out of round. The end damage has reduced the capacity of both pipes. The trashrack, while preventing floating debris from entering and blocking the spillway pipes, may itself be susceptible to blockage, which would reduce the discharge capacity of the pipes.

Because the 6-inch diameter outlet pipe riser is at elevation 1335.0 and the existence of a lower inlet could not be established, there is no apparent means of drawing down the pool lower than elevation 1335.0 in case of an emergency.

(4) Reservoir Area. There are two small ponds within the watershed on the southwest side of the reservoir. It is believed that the ponds would have a negligible effect on the hydrology of Deer Lake.

(5) Downstream Conditions. A failure of the dam would flood two recently constructed houses at the toe of the dam and cause severe damage. Flooding of 6 to 8 other houses located along the stream would also be experienced, although to a lesser degree. This indicates that a high hazard classification is warranted for Deer Lake Dam. A failure of Deer Lake Dam would have no effect on Lake Wallenpaupack.

(d) Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (small) and hazard potential (high) of Deer Lake Dam is between one-half of the Probable Maximum Flood (PMF) and the PMF. Because the size of Deer Lake Dam is at the low end of the small size classification, the 1/2 PMF is selected as the SDF. The watershed and reservoir were modeled with the U.S. Army Corps of Engineers HEC-1DB computer program. A description of the model is included in Appendix D. The assessment of hydrology and hydraulics is based on existing conditions, and the effects of future development are not considered.

(2) Summary of Results. Pertinent results are tabulated at the end of Appendix D. The analysis reveals that Deer Lake Dam can pass about 15 percent of the PMF before overtopping of the dam occurs. The dam is rated at the previously noted minimum top of dam elevation.

(3) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix D. Because Deer Lake Dam cannot pass the 1/2 PMF and was considered to fail during storms as small as 30 percent of the PMF, a failure analysis was performed. It was assumed that Deer Lake Dam would begin to fail during the 1/2 PMF when the pool level reached elevation 1337.2, which is 0.5 foot above the low point on the top of the dam. Other assumptions used to model the failure are described in Appendix D. The resulting outflow was routed downstream to Lake Wallenpaupack. Failure of Deer Lake Dam during the 1/2 PMF would raise water levels at a point 900 feet downstream from the dam by 4.8 feet over levels that existed just prior to failure of the dam. Further more, the two dwellings located at the downstream toe of the dam would experience increased water levels greater than 6 feet. Therefore, the spillway is rated as seriously inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Deer Lake Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. The growth of the trees on the embankment slopes and at the downstream toe is a minor hazard at present. Root systems of large trees can loosen embankment material, displace slope protection, and create paths along which seepage and piping (internal erosion) might occur. Because of the low height of the embankment in the area of the trees, the hazard is only considered to be minor. The other small brush on the slopes is no hazard at present, although further growth is undesirable. The erosion of the upstream slope is not considered to be an immediate hazard, but should be monitored. Further erosion could become a hazard.

The low areas on the embankment in the vicinity of the spillway pipes may be the result of settlement around the pipes due to poor backfill material and placement, or they may be the result of seepage along the pipes. While not considered to be a major hazard at the present time, further settlement could indicate the development of a hazardous condition.

(3) Appurtenant Structures. No structural deficiencies were observed at the spillway, except for the previously mentioned settlement and the crushed ends of the pipes. The damaged ends of the pipes are not considered to be a hazard to the structural stability of the dam.

b. Design and Construction Data. No stability analyses are available for the embankment. There are no definitive data concerning the composition of the embankment. There are no data concerning the foundation conditions. Based on visual observations and discussions with the Owner, all that can be determined is that the embankment is an earthfill structure constructed of local material.

c. Operating Records. There are no formal records of operation.

d. Post-construction Changes. Post-construction changes are described in Paragraph 1.2g. The changes have been assessed with the dam.

e. Seismic Stability. Deer Lake Dam is located in Seismic Zone 1. Earthquake loadings are not considered to be significant for small dams located in Seismic Zone 1 when there are no readily apparent stability problems. Since there are no readily apparent stability problems, the ability of the embankment to withstand an earthquake is assumed to be adequate.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, calculations, and past operational performance, Deer Lake Dam is judged to be in fair condition. Based on the size and hazard classification of the dam, the recommended SDF at the dam varies between the 1/2 PMF and the PMF. Based on the criteria, the selected SDF is the 1/2 PMF. Based on existing conditions, the spillway will pass about 15 percent of the PMF before overtopping of the dam occurs. It is judged that the dam could not withstand the depth and duration of overtopping that would occur for the 1/2 PMF. Failure of the dam would cause an increased hazard for loss of life downstream. The spillway capacity is rated as seriously inadequate. According to criteria established for these studies, the dam is judged to be unsafe, non-emergency, because the spillway capacity is seriously inadequate.

(2) No stability problems are evident at the dam.

(3) The ability of the outlet works to function is unknown. There are no known upstream closure facilities.

(4) Maintenance at the dam needs to be improved. The right half of the dam is overgrown with trees and brush, and large trees are growing along the downstream toe.

(5) A summary of the features and observed deficiencies is listed below:

Feature	Observed Deficiency
Embankment:	Trees and brush; erosion of upstream slope at waterline; downstream slope irregular; low areas on top of dam; seepage at toe near outlet pipe; animal burrows near right abutment.
Outlet Works:	Not maintained; no known upstream closure; ability to lower pool unknown; outlet is buried.

Feature	Observed Deficiency
Spillway:	Inlet and outlet ends of pipes are crushed out of round.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented immediately.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following studies and remedial measures are recommended to be undertaken by the Owner, in approximate order of priority, immediately:

(1) Perform additional studies to more accurately ascertain the spillway capacity required for Deer Lake Dam as well as the nature and extent of measures required to provide adequate spillway capacity. Take approriate action as required.

(2) Determine the ability of the outlet works to draw the reservoir down to an appropriate level and, if the existing outlet works cannot draw the pool down, develop a suitable means of drawing down the reservoir in case of an emergency. Any pipe that is placed through the embankment should be provided with an upstream closure facility. The buried outlet should be uncovered to provide for free discharge.

(3) Remove trees and brush from the dam and along the toe of the dam.

(4) Fill in the low areas on the top of the dam and all burrowing animal holes.

All investigations, studies, designs, and inspection of construction should be performed by a professional engineer experienced in the design and construction of dams. Tree removal should also be under the guidance of a professional engineer.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Deer Lake Dam. When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of the dam.

(3) Initiate an inspection program at the dam such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Expand the existing maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: DEER LAKE DAM

NDI ID NO.: PA-00698 DER ID NO.: 64-202

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	See Plate E-1
CONSTRUCTION HISTORY	Reported by Owner to have been constructed between 1968 and 1970 by a contractor: Paul Evans. Modified outlet pipe and spillway pipes 3 or 4 years ago.
TYPICAL SECTIONS OF DAM	None.
OUTLETS: Plan Details Constraints Discharge Ratings	6" C.I.P. riser with gate valve 2-27" C.M.P. comprise spillway.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	None.
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	None.
POSTCONSTRUCTION SURVEYS OF DAM	None.

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	Unknown.
MONITORING SYSTEMS	None.
MODIFICATIONS	6" CIP outlet and 2-27" CMP Spillway pipes modified in 1976 or 1977
HIGH POOL RECORDS	Owner reported that 6" deep flow through Spillway pipes is maximum that was ever observed. Date not available.
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	None.

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	None.
SPILLWAY: Plan Sections Details	2- 27" C.M. Pipes with trash screen form spillway. See plates and photographs.
OPERATING EQUIPMENT: Plans Details	None.
PREVIOUS INSPECTIONS Dates Deficiencies	None.

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: Deer Lake County: Wayne State: Pennsylvania

NDI ID No.: PA 00698 DER ID No.: 64-202

Type of Dam: Earthfill Hazard Category: High

Date(s) Inspection: 28 October 1980 Weather: Overcast, windy Temperature: 50°F

Pool Elevation at Time of Inspection: 1335± msl/Tailwater at Time of Inspection: 1314± msl

Note: Elevations estimated from USGS quadrangle - Lakeville, PA

Inspection Personnel:

W.B. Bingham (GFCC) Pat Cuff (Wallenpaupack Lake Estates - Part of Time)

R.E. Holderbaum (GFCC)

D.R. Ebersole (GFCC)

R.E. Holderbaum Recorder

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	Crest is covered with vegetation.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed, but toe is very irregular	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	Minor erosion of upstream slope at water level. (1-2 feet) Downstream slope very irregular; slope is excavated to a depth of 10 ft.± at outlet works valve.	
CREST ALIGNMENT: Vertical Horizontal	Low area, 15'x3'x 12"to18" deep, on crest about 20' right of of the bulkhead. A second low area about 12" deep is located over the outlet pipes on the crest.	Horizontal alignment is very irregular.
RIPRAP FAILURES	None – no riprap.	

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	Abutments - good. Considerable settlement on crest over 2-27" CMP spillway pipes	
ANY NOTICEABLE SEEPAGE	Seepage observed at toe of dam below gate valve on 6" outlet pipe ~5 gpm total flow.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	
RODENT HOLES	Several holes on downstream slope	
TREES & BRUSH	Numerous pine trees at toe and on downstream slope, some to 15" diam. Several large trees recently cut.	Brush and small trees on upstream slope at right half of embankment; brush on downstream slope.

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet conduit is 6" C.I. Pipe riser about 10'± from edge of water; conduit is submerged.	
INTAKE STRUCTURE	None.	
OUTLET STRUCTURE	Outlet is buried and could not be located but owner reported outlet is just downstream from valve	at toe of dam. See Plate B-1.
OUTLET CHANNEL	No well defined channel.	
EMERGENCY GATE	Gate valve on 6" C.I.P. near toe of dam. See Exhibit B-1	Valve has not been operated recently.

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	No weir; spillway consists of 2-27" C.M. Pipes. Both inlet and outlet ends of pipes have been damaged and bent out of round.	Pipe joints and collars reportedly were repaired several years ago; fill around pipes has settled 12" to 24" along entire length of pipe.
APPROACH CHANNEL	Lake - unobstructed; iron trash rack covers ends of pipes. Some fill has wash away around pipe inlets.	
DISCHARGE CHANNEL	Vegetated channel located well away from embankment. Channel appears to be adequate. Crosses gravel	road about 150 feet downstream through 48" diam. C.M. Pipe.
BRIDGE AND PIERS	None.	

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR AND WATERSHED

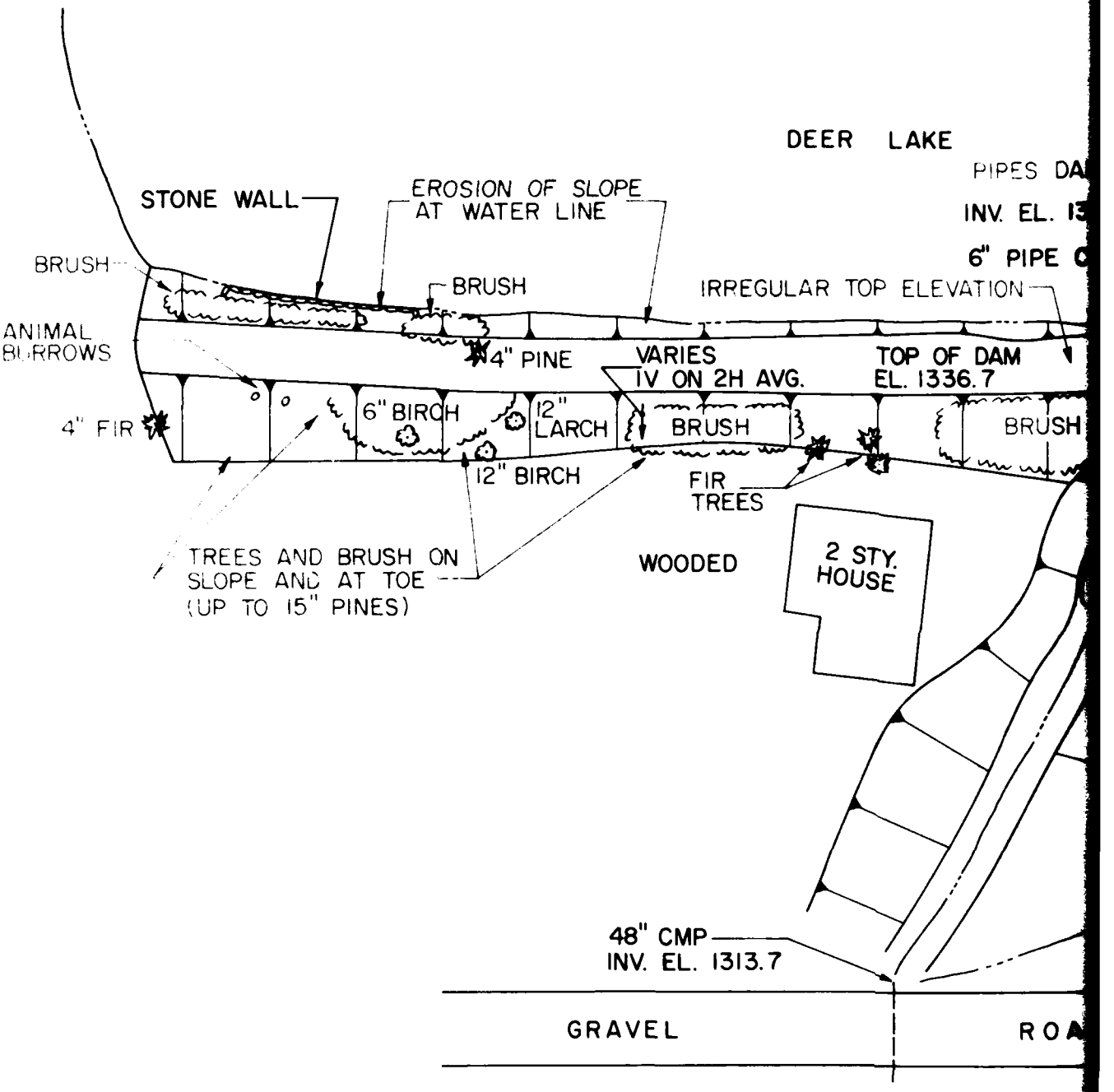
Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate slopes, mostly wooded with some residential development.	
SEDIMENTATION	Unknown. No problems reported.	
WATERSHED DESCRIPTION	Mostly wooded with some fields, open areas and scattered homesites; two small ponds on southwest	side of reservoir. Ponds have negligible effect on hydrology for Deer Lake.

DOWNSTREAM CHANNEL

Sheet 1 of 1

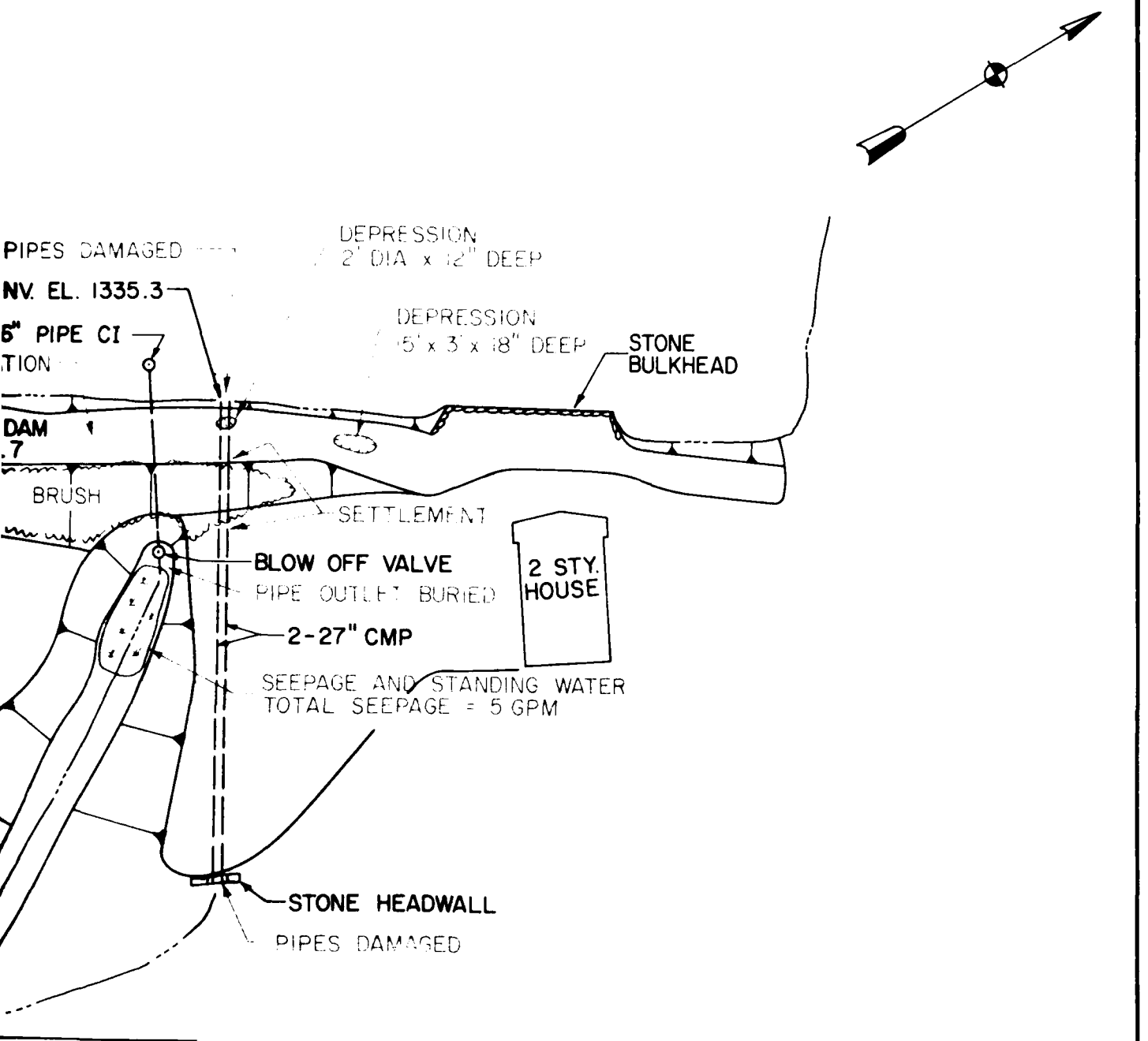
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	No major obstructions. Stream discharges into Lake Wallenpaupack 2000 feet downstream from dam.	
SLOPES	Steep channel slope, averaging 8 percent.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Two homes located along the toe of dam; 6-8 other homes are located along stream	Channel. Population more than 25.



DATE OF INSPECTION: 28 OCTOBER 1980
POOL ELEVATION: 1335.0 FEET

SCALE: 1 IN. = 40 FT. ±

40 0 40



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM

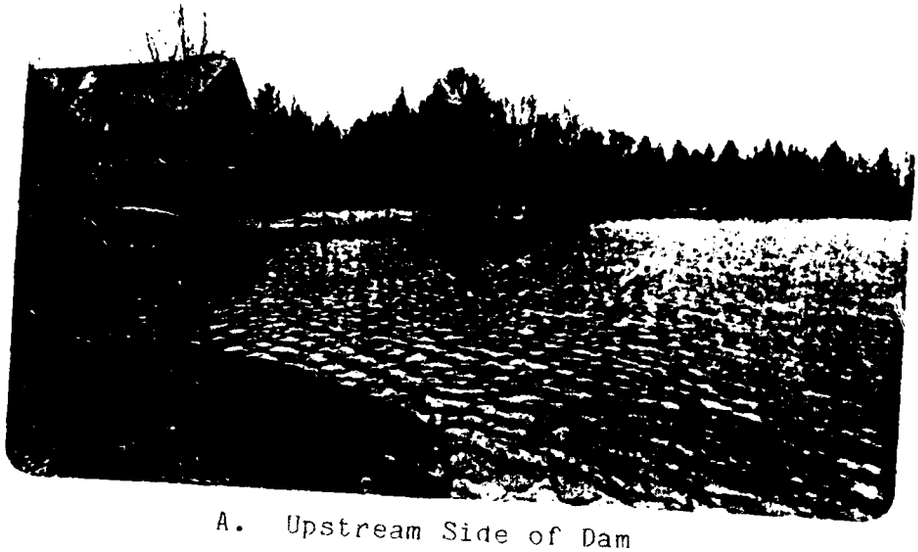
WALLENPAUPACK LAKE ESTATES

RESULTS OF VISUAL INSPECTION

JANUARY 1981 EXHIBIT B-1

APPENDIX C

PHOTOGRAPHS



A. Upstream Side of Dam

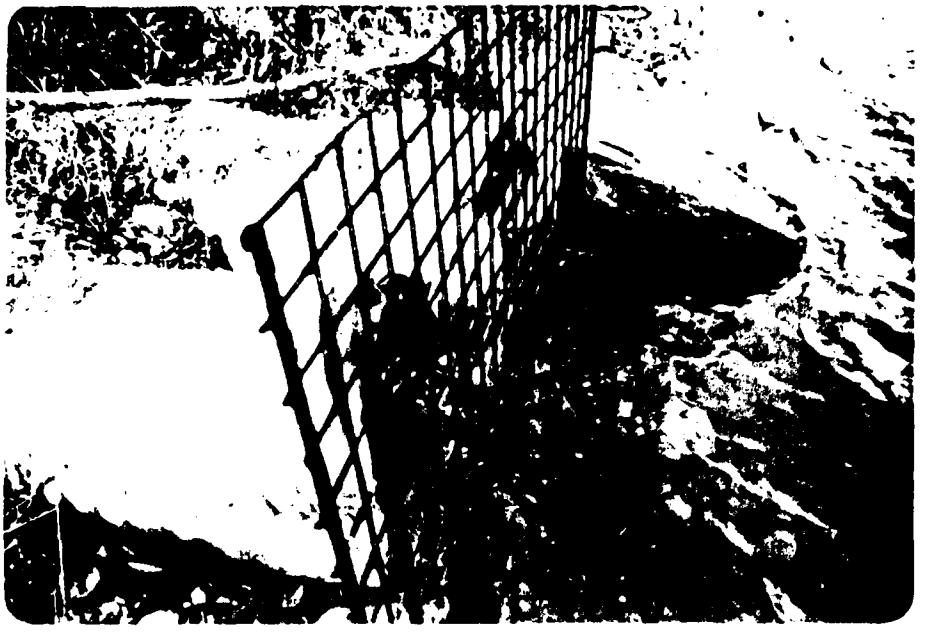
B. Crest and Upstream Slope
(Spillway at center of photograph)

C. Upstream Slope and Crest

D. Downstream Slope

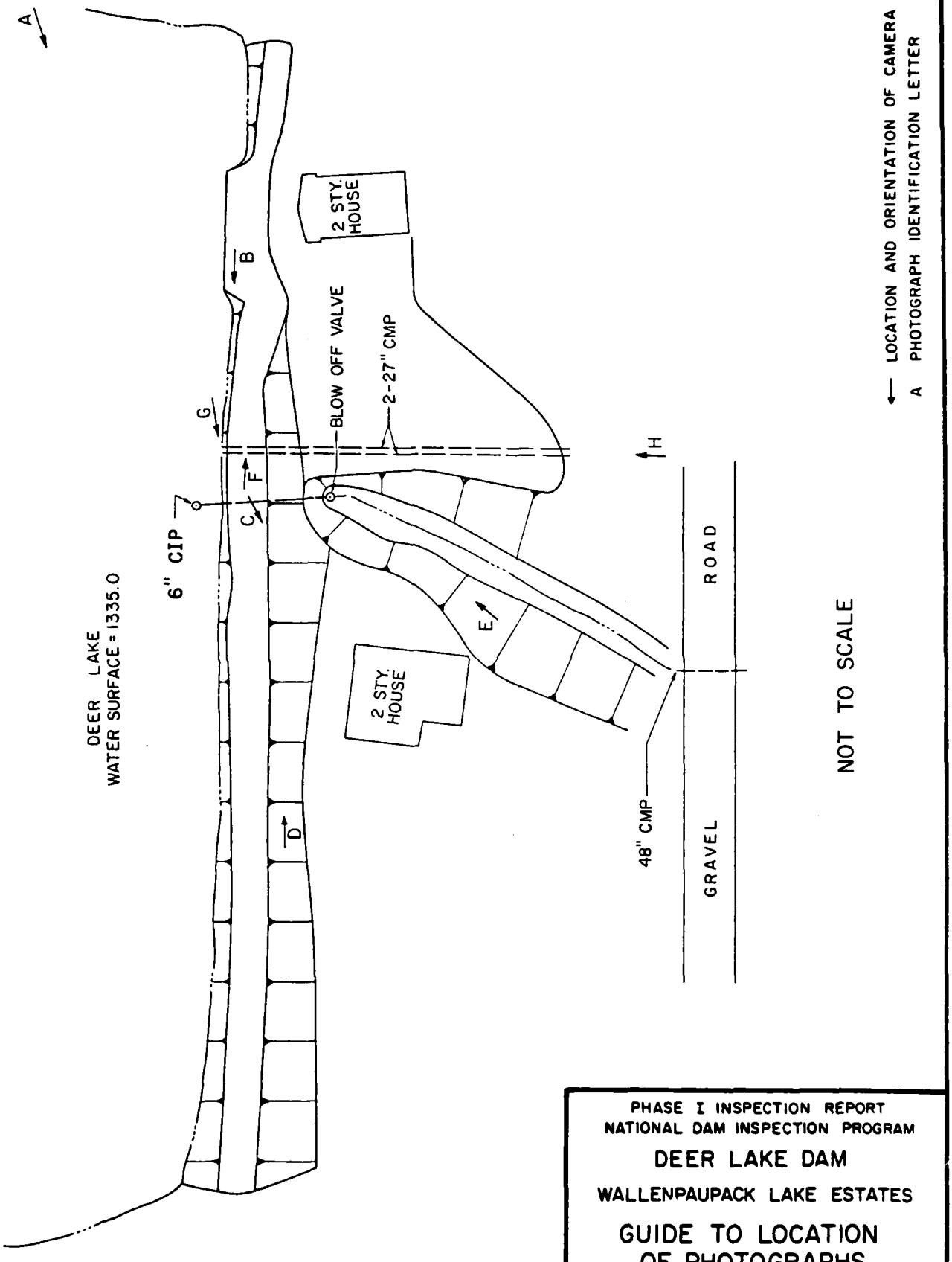
E. Marshy Area at Toe

F. Low Area On Crest



G. Spillway Entrance

H. Spillway Exit



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM

WALLENPAUPACK LAKE ESTATES

GUIDE TO LOCATION OF PHOTOGRAPHS

JANUARY 1981 EXHIBIT C-1

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D

HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

Description of Model:

If the Owner has not developed a PMF for the dam, the watershed is modeled with the HEC-1DB computer program, which was developed by the U.S. Army Corps of Engineers. The HEC-1DB computer program calculates a PMF runoff hydrograph (and percentages thereof) and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. By modifying the rainfall criteria, it is also possible to model the 100-year flood with the program.

APPENDIX D

DELAWARE River Basin
Name of Stream: TRIBUTARY TO LAKE WALLENPAUPACK
Name of Dam: DEER LAKE DAM
NDI ID No.: PA-000698
DER ID No.: 64-202
Latitude: N 41° 23.7' Longitude: W 75° 16.0'
Top of Dam Elevation: 1336.7 FEET
Streambed Elevation: 1325.0 Height of Dam: 12 ft
Reservoir Storage at Top of Dam Elevation: 114 acre-ft
Size Category: SMALL
Hazard Category: HIGH (see Section 5)
Spillway Design Flood: 1/2 PMF TO PMF; SELECT 1/2 PMF
BASED ON SIZE OF STRUCTURE AND STORAGE.

UPSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
NO UPSTREAM DAMS				

DOWNSTREAM DAMS

LAKE WALLENPAUPACK	~2000 FEET DOWNSTR.			

DELAWARE River Basin

Name of Stream: TRIB. TO LAKE WALLENPAUPACK

Name of Dam: DEER LAKE DAM

DETERMINATION OF PMF RAINFALL & UNIT HYDROGRAPH

UNIT HYDROGRAPH DATA:

Sub-area	Drainage Area (square miles)	Cp (1)	Ct (2)	L* miles (3)	L_{ca}* miles (4)	L' miles (5)	Tp hours (6)	Map Area (7)	Plate (8)
	0.28	0.45	1.23	0.61	0.20	N/A	0.65	1	A
Total	0.28								

(See Sketch on Sheet D-4)

(1) & (2): Snyder Unit Hydrograph coefficients supplied by Baltimore District, Corps of Engineers on maps and plates referenced in (7) & (8)

The following are measured from the outlet of the subarea:

(3): Length of main watercourse extended to divide

(4): Length of main watercourse to the centroid

The following is measured from the upstream end of the reservoir at normal pool:

(5): Length of main watercourse extended to divide

(6): $Tp=C_t \times (L \times L_{ca})^{0.3}$, except where the centroid of the subarea is located in the reservoir. Then $Tp=C_t \times (L')^{0.6}$

Initial flow is assumed at 1.5 cfs/sq. mile

Computer Data: QRCSN = -0.05 (5% of peak flow)
RTIOR = 2.0

RAINFALL DATA:

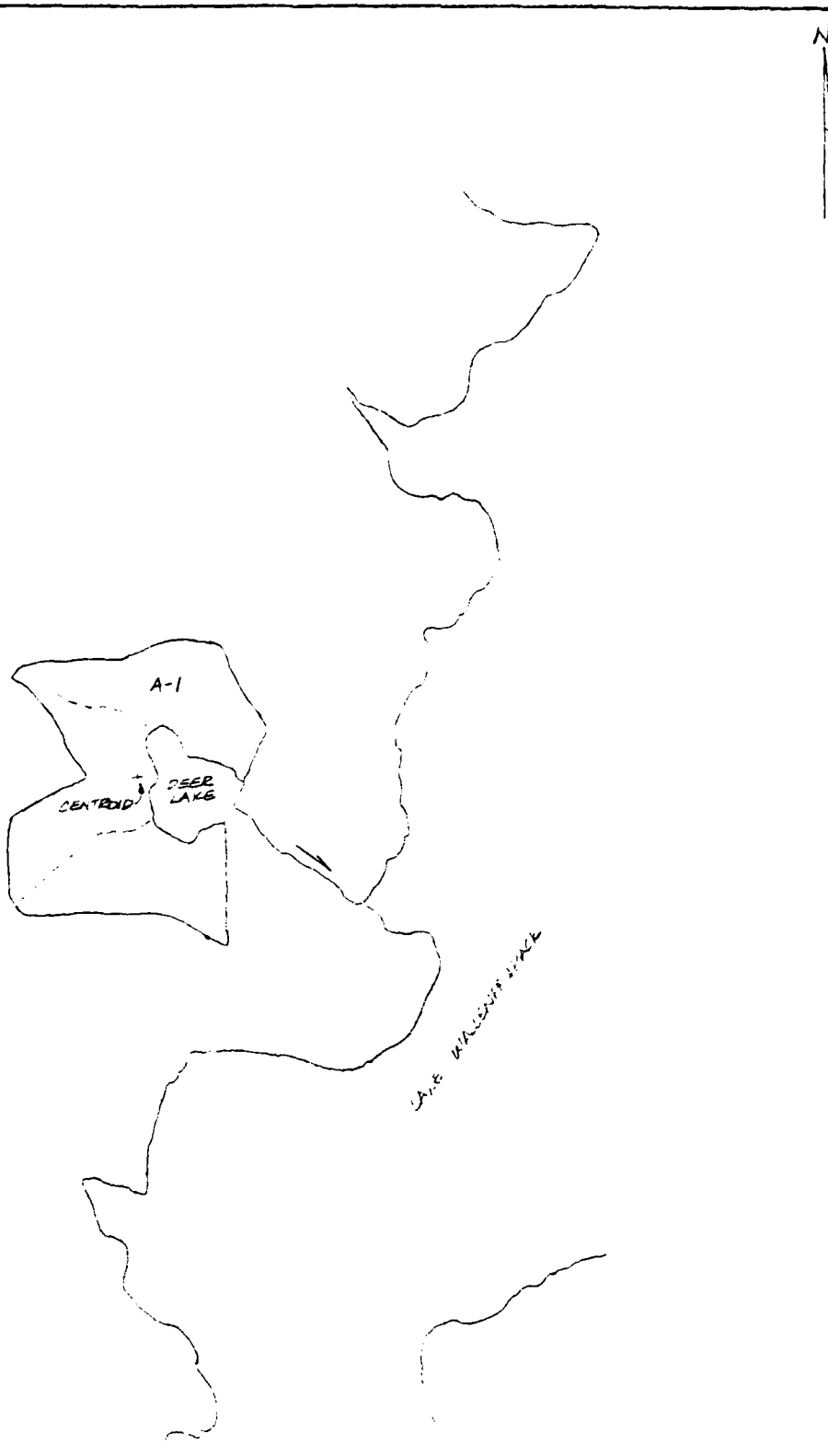
PMF Rainfall Index= 21.6 in., 24 hr., 200 sq. mile

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone:	N/A	1
Geographic Adjustment Factor:	N/A	1.0
Revised Index Rainfall:	N/A	21.6

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	111
12 hours	123
24 hours	133
48 hours	142
72 hours	—
96 hours	—

* AVERAGE OF TWO MAIN WATERCOURSES



DEER LAKE DAM
SKETCH OF SYSTEM

Data for Dam at Outlet of Subarea A-1

Name of Dam: DEER LAKE DAM

SPILLWAY DATA:	Existing Conditions	Design Conditions
		(N/A)
Top of Dam Elevation	1336.7	
Spillway Crest Elevation	1335.3	
Spillway Head Available (ft)	1.4	
Type Spillway	2- CMP's	
"C" Value - Spillway	N/A	
Crest Length - Spillway (ft)	N/A	
Spillway Peak Discharge (cfs)	56	
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)		
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)		

Spillway Rating Curve: $Q = 1.49/n \; R^{2/3} S^{1/2} A$

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)
1335.3	0	N/A	N/A
1336.4	45		
1337.6	90		
	assumed constant above 1337.6 feet (Pressure flow)		

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet			
Invert of Inlet			
Type			
Diameter (ft) = D			
Length (ft) = L			
Area (sq. ft) = A			
N			
K Entrance			
K Exit			
K Friction=$29.1 n^2 L/R^{4/3}$			
Sum of K			
$(1/K)^{0.5} = C$			
Maximum Head (ft) = HM			
$Q = CA\sqrt{2g(HM)}$ (cfs)			
Q Combined (cfs)			

INADEQUATE INFORMATION

Data for Dam at Outlet of Subarea A-1 (See sketch on Sheet D-4)

Name of Dam: DEER LAKE DAM

STORAGE DATA:

Elevation		Area (acres)		Storage million gals	Storage acre-ft		Remarks
1325.0	=ELEV0*	0		0	0		
1335.3	=ELEV1	23	=A1			=S1	NORMAL POOL
1340.0		36					

* ELEV0 = ELEV1 - $(3S_1/A_1)$
** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 13 percent of subarea watershed.

BREACH DATA:

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: CLAY

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 3.0 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2) \cong$ 0.5 ft., C = 2.8 Top of Dam El.= 1336.7

HMAX + Top of Dam El. = 1337.2 FEET = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 30 ft (width of bottom of breach)
Z = 0.5 (side slopes of breach)
ELBM = 1325 (bottom of breach elevation, minimum of zero storage elevation)
WSEL = 1335.3 (normal pool elevation)
T FAIL = 60 mins = 1.0 hrs (time for breach to develop)

SELECTED COMPUTER OUTPUT

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********************************
    1                 A1                    NATIONAL DAM INSPECTION PROGRAM
    2                 A2                BALTIMORE DISTRICT CORPS OF ENGINEERS
    3                 A3                          DEER LAKE DAM
    4                 B    300       0       15       0       0       0       0       0      -4       0
    5                 B1     5
    6                 J      1       5       1
    7                 J1   1.0     0.5     0.3     0.2     0.1
    8                 K      0       1                                       1
    9                 K1       INFLOW TO DEER LAKE
   10                 M      1       1    0.28               0.28                                   1
   11                 P              21.6     111     123     133     142
   12                 T                                                       1.0    0.05             .13
   13                 W    0.65    0.45
   14                 X    -1.5   -0.05     2.0
   15                 K      1       1                                       1
   16                 K1       ROUTE THROUGH DEER LAKE
   17                 Y                                       1       0
   18                 Y1     1                                                -1335.3      -1
   19                 Y4 1335.3  1336.4  1337.6  1339.0  1341.0
   20                 Y5     0      45      90      90      90
   21                 $A     0      23      36
   22                 $E  1325  1335.3    1340
   23                 $$1335.3
   24                 $D1336.7
   25                 $L     0      60     415     475     545     580
   26                 $V1336.7  1337.0  1337.5  1338.0  1338.5  1339.0
   27                 K     99
```

D-8

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .50	RATIO 3 .30	RATIO 4 .20	RATIO 5 .10
HYDROGRAPH AT	1	.28	1	981.	491.	294.	196.	98.
	(	.73)	(	27.78)(	13.89)(	8.34)(	5.56)(	2.78)(
ROUTED TO	1	.28	1	926.	403.	158.	63.	32.
	(	.73)	(	26.22)(	11.41)(	4.47)(	1.78)(	.91)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1335.30	1335.30	1336.70
STORAGE	79.	79.	114.
OUTFLOW	0.	0.	56.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1337.93	1.23	148.	926.	11.25	40.50	0.00
.50	1337.57	.87	138.	403.	8.00	40.75	0.00
.30	1337.27	.57	129.	158.	6.00	42.00	0.00
.20	1336.84	.14	117.	63.	3.00	42.75	0.00
.10	1336.09	0.00	98.	32.	0.00	42.75	0.00

01-0

Overtopping Summary
Deer Lake Dam

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1                A1                    NATIONAL DAM INSPECTION PROGRAM
    2                A2                BALTIMORE DISTRICT CORPS OF ENGINEERS
    3                A3                          DEER LAKE DAM
    4                B    300       0       15        0        0        0        0        0       -4        0
    5                B1     5
    6                J      2       1        1
    7                J1   0.5
    8                K      0       1                                          1
    9                K1       INFLOW TO DEER LAKE
   10                H      1       1    0.28                0.28                                    1
   11                P             21.6     111      123      133      142
   12                T                                                        1.0     0.05                    .13
   13                W    0.65    0.45
   14                X    -1.5   -0.05     2.0
   15                K      1       1                                          1
   16                K1       ROUTE THROUGH DEER LAKE
   17                Y                                        1        1
   18                Y1     1                                                       -1335.3      -1
   19                Y&1335.3  1336.4  1337.6  1339.0  1341.0
   20                YS     0      45      90       90       90
   21                $A     0      23      36
   22                $E  1325  1335.3    1340
   23                $$1335.3
   24                $D1336.7
   25                $L     0      60     415      475      545      580
   26                $V1336.7  1337.0  1337.5  1338.0  1338.5  1339.0
   27                $B    30     0.5    1325      1.0  1335.3  1340.0
   28                $B    30     0.5    1325      1.0  1335.3  1337.2
   29                K      1       2                                          1
   30                K1       STREAM SECTION NUMBER 1
   31                Y                                        1        1
   32                Y1     1                                                        -1
   33                Y6   0.1    0.05     0.1     1280     1305      900    0.06
   34                Y7     0    1320     290     1300      365     1282      365     1280      375     1280
   35                Y7   375    1282     470     1300      800     1320
   36                K      1       3                                          1
   37                K1       STREAM SECTION NUMBER 2
   38                Y                                        1        1
   39                Y1     1                                                        -1
   40                Y6   0.1    0.05     0.1     1200     1225     1100   0.073
   41                Y7     0    1240     350     1220      695     1202      695     1200      705     1200
   42                Y7   705    1202     800     1220     1100     1240
   43                K     99
```

11-0

SUMMARY OF DAM SAFETY ANALYSIS

Deer Lake Dam

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1335.30	1335.30	1336.70
STORAGE	79.	79.	114.
OUTFLOW	0.	0.	56.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1337.57	.87	138.	403.	8.00	40.75	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1335.30	1335.30	1336.70
STORAGE	79.	79.	114.
OUTFLOW	0.	0.	56.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1337.49	.79	136.	3035.	1.94	41.25	40.25

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	402.	1283.0	40.75

PLAN 2 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	2980.	1287.8	41.25

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	405.	1202.8	41.00

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	2880.	1206.2	41.25

Deer Lake Dam
Dam Breach & Channel
Routing Summary

BY _____ DATE _____ SUBJECT _____ SHEET NO _____ OF _____

CHKD. BY _____ DATE _____ JOB NO _____

DEER LAKE DAM

Summary of Pertinent Results

Multi-ratio Analysis:

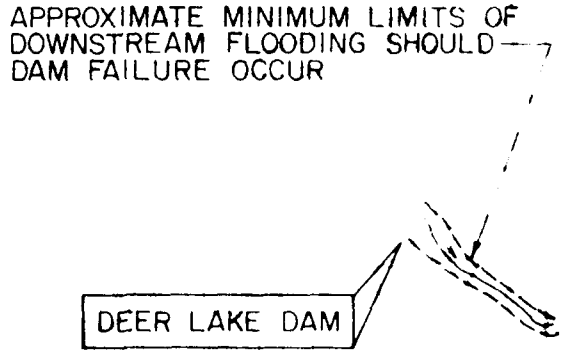
	PMF	½PMF
Rainfall (inches)	24.54	–
Runoff (inches)	22.46	11.23
Peak Inflow (cfs.)	981	491
Peak Outflow (cfs.)	926	403
Depth of Overtopping (ft.)	1.23	0.87
Duration of Overtopping (hrs.)	11.25	8.00

Breach and Channel Routing Analysis (½ PMF):

	No failure	Failure	Difference
Peak Outflow (cfs)	403	3035	2652
Stream Depth (ft)			
at section 1	3.0	7.8	4.8
section 2	2.8	6.2	3.4

NOTES:

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS.
2. CIRCLED NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.
3. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.



2000 0 2000

SCALE: 1 IN. = 2000 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM

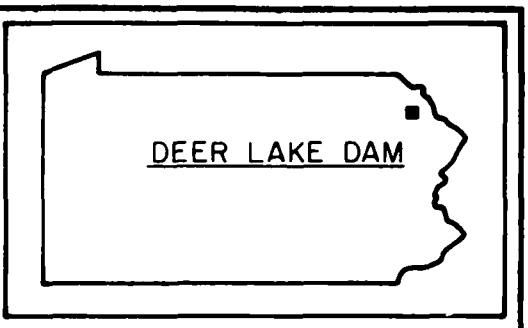
WALLENPAUPACK LAKE ESTATES

DOWNSTREAM DEVELOPMENT PLAN

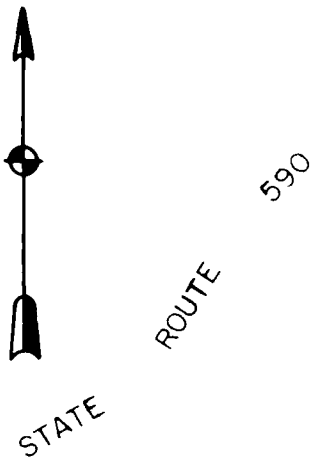
JANUARY 1981 EXHIBIT D-1

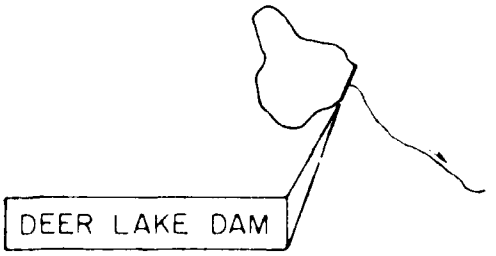
APPENDIX E

PLATES



7 1/2 MINUTE QUADRANGLE:
LAKEVILLE, PA.





2000 0 2000

SCALE: 1 IN. = 2000 FT.

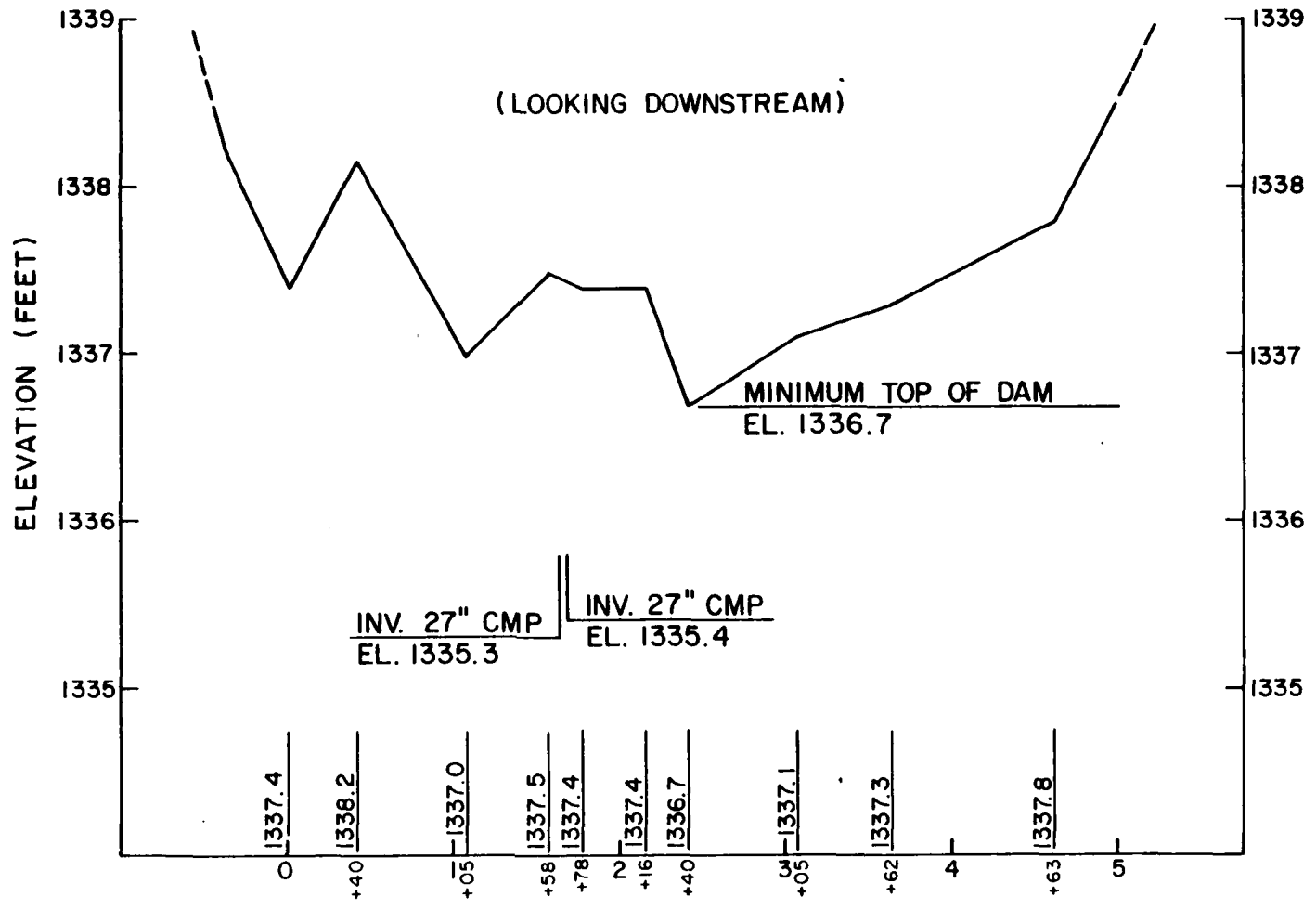
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM

WALLENPAUPACK LAKE ESTATES

LOCATION MAP

JANUARY 1981 PLATE E-1



PROFILE-TOP OF DAM

SCALE: HORIZ.: 1 IN. = 100 FT.
VERT.: 1 IN. = 1 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM

WALLENPAUPACK LAKE ESTATES

PROFILE-TOP OF DAM

JANUARY 1981

PLATE E-2

APPENDIX F

GEOLOGY

DEER LAKE DAM

APPENDIX F

GEOLOGY

Deer Lake Dam is located in Wayne County within the Appalachian Plateau Physiographic Province. The most pronounced topographic feature in the area is Camelback Mountain, which is part of the Pocono Plateau Escarpment. The escarpment has a well-defined, south westward trend from Camelback Mountain, but it is irregular between Camelback Moutain and Mt. Pocono, which lies to the north. Streams east of the excarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the excarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

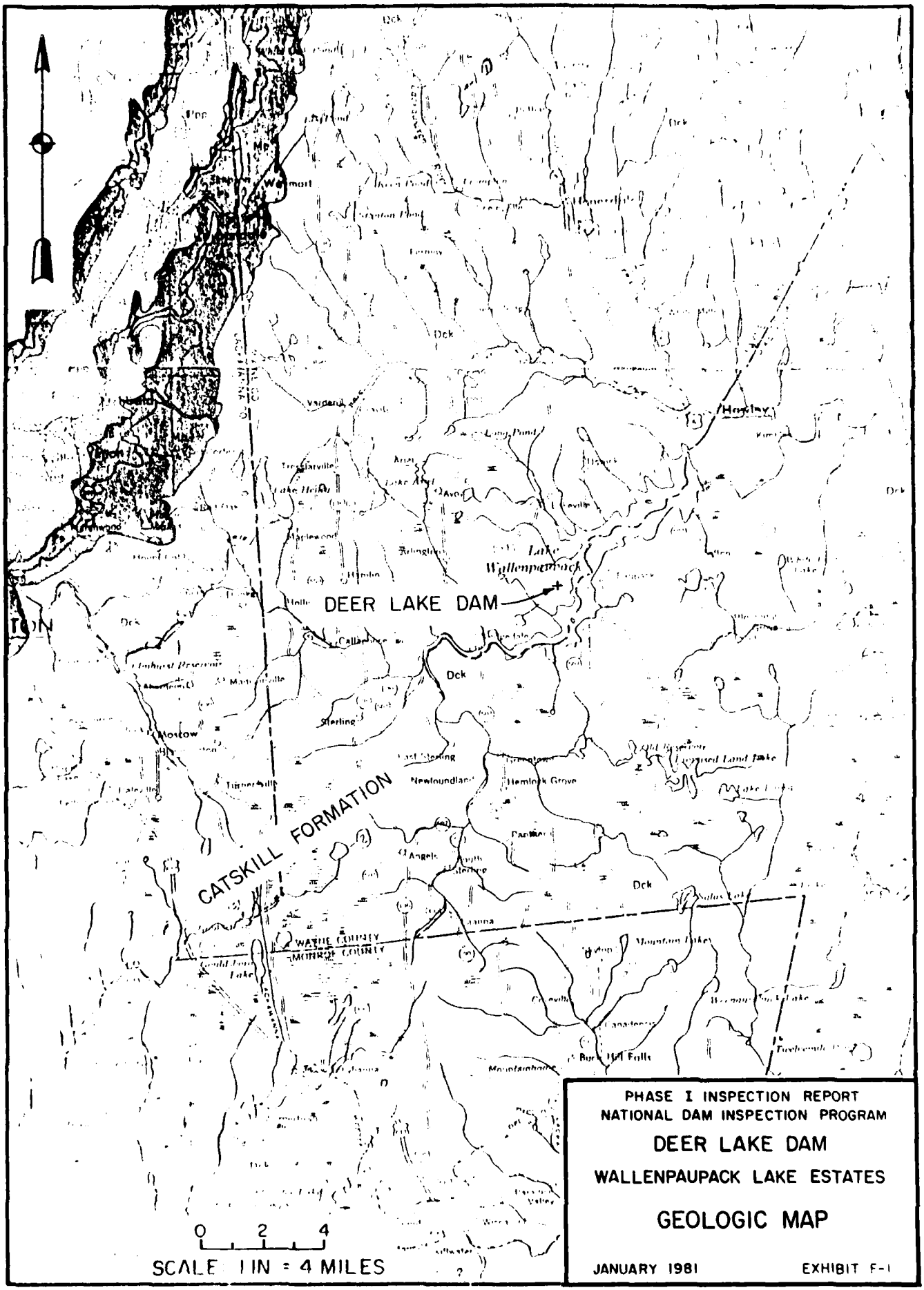
East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by preglacial erosional topography with locally-thick glacial deposits. Local relief is generally 100 to 300 feet.

Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic environments, and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing Member; sandstone, siltstone and shale of the Walcksville Member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

Deer Lake Dam is underlain by the Catskill Formation. The Catskill Formation is predominantly red to brownish gray shales and sandstone with interbedded siltstones and conglomerates. Sandstones present are thickbedded, fine- to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is generally derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet.

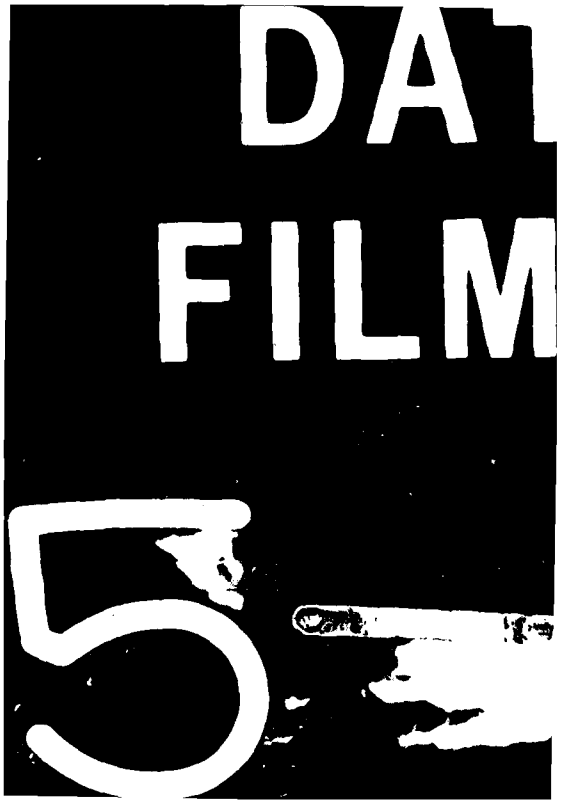


PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEER LAKE DAM
WALLENPAUPACK LAKE ESTATES

GEOLOGIC MAP

JANUARY 1981 EXHIBIT F-1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